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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS:	GÜNTHER KNEBEL	EXAMINER:	M. A. ANDERSON
SERIAL NO.:	09/883,435	GROUP:	1765
FILED:	JUNE 18, 2001		
FOR:	REACTION VESSEL		

BRIEF IN SUPPORT OF APPEAL

Mail Stop Appeal-Brief
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal from the final rejection of claims 1-3, 6-10. 12-24, 27-36, 38, 53 and 54.

REAL PARTY IN INTEREST

The real parties in interest are the assignees, Greiner Bio-One GmbH and Max-Planck-Gesellschaft zur Förderung der Wissenschaft e.V.

RELATED APPEALS AND INTERFERENCES

The appellants and the appellants' legal representatives know of no other appeals or interferences which will directly

affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

STATUS OF CLAIMS

All appealed claims were finally rejected.

SUMMARY OF THE INVENTION

A plurality of production processes can be operated very efficiently with different process parameters in reaction vessel 1 to produce crystals from a substance 31 in liquid form or in solution. The reaction vessel comprises at least one housing part 2, 3 having several walled reaction chambers 6, each forming a separate gas chamber. Each walled reaction chamber 6 has inside thereof a reservoir 7 and several reaction areas 8 cooperating therewith. Reaction areas 8 are connected to one another and to reservoir 7 in order to exchange gas. As seen in Figs. 4 and 6, walled reaction chambers 6 are disposed immediately adjacent each other in straight rows, and the straight rows are disposed immediately adjacent to one another in immediately adjacent, parallel rows and distributed in an identical manner. The immediately adjacent walled reaction chambers 6 in the immediately adjacent, parallel rows and in each row are demarcated from one another by common walls 12,

whereby the number of reaction chambers in reaction vessel 1 is maximized.

As shown in the drawing, reaction chambers 6 are preferably identical in structure. They may have a base surface area in the form of a parallelogram.

According to one preferred feature, undersides 23 of vessel floors 4 of reaction chambers 6 come into contact with a plane parallel with standing plane 13.

As illustrated in Fig. 4, reaction chambers 6 as well as reservoirs 7 may have a rectangular cross section in a plane parallel to standing plane 13.

As shown in Figs. 4 and 5, more or less plate-shaped housing bottom part 19, which consists of frame 20, is used as the housing part having the reaction chambers 6, and frame 20 extends laterally from edge 21 of top face 22 of housing bottom part 19 down in the direction of underside 23 of vessel base 4.

Vessel bottom parts 2 comprise at least one reservoir 7 and several, for instance three, reaction areas 8.

Preferably, reaction areas 8 of vessel bottom parts 2 are disposed at a height 11 of about 5 to 10 mm above vessel base 4 of reservoir 7, and the reaction areas are recesses with a capacity of less than 5 µl. Recesses 8 may be of a plate-shaped cuboid design or in a cylindrically-shaped disc. The floors of the recesses may be of an approximately convex curvature relative to the floors.

As shown in Figs. 4 and 6, as seen in a plan view down onto standing plane 13, the rows of reaction areas 8, 15 lie respectively adjacent to the rows of reservoirs 7. The reaction areas and the reservoirs extend in rows parallel to the row of walled reaction chambers 6, and each row of reaction areas is adjacent to a row of reservoirs in the immediately adjacent row of walled reaction chambers.

It is useful for frame 20 of housing bottom part 19 and the layout of reaction chambers 6 to be designed to conform to a standard size of a micro-titre plate.

Preferably, the number of reaction chambers 6 in housing bottom part 2 is selected from a group based on a mathematical

formula of 3×2^N where N is a natural number, and the housing bottom part is made from a transparent plastics material. Also the same number of vessel top parts may be provided in the vessel cover.

As shown in Figs. 6 and 7, a housing part comprises an at least approximately lid-type vessel cover 25, preferably made of a transparent plastics material, with grooves 29 on underside 28 of the vessel cover, and the vessel cover contains at least one reaction area 15, preferably several, such as two. Frame 26 projecting beyond underside 28 is provided on edge 27 of the underside. Mask 17 may be applied to the face of vessel cover 25 remote from reaction areas 15 and, seen in a plan view down onto standing plane 13, the mask surrounds the reaction areas with a light-screening surface.

It is also possible to arrange the walled reaction chambers in the form of prisms with a regular hexagonal base surface disposed in a honeycomb arrangement.

In the specific embodiment illustrated in Fig. 1, reaction vessel 1 comprises bottom part 2 with a vessel floor 4 and vessel walls 5 forming several walled reaction chambers 6. Each reaction chamber has inside thereof a reservoir 7 for liquid agents 31 (Fig. 9) and at least one reaction area 8

separated from the reservoir and having a gas connection thereto. Adjacent walled reaction chambers 6 are demarcated from each other by a common vessel wall 5, whereby the number of reaction chambers in the reaction vessel is maximized. Vessel top part 3, which lies against the vessel walls, optionally with a sealing layer 14 in between, covers the walled reaction chambers, and there is at least another reaction area 15 formed by a recess above reservoir 7 in the vessel top part. Recess 15 may be of a cylindrical disc shape or in the form of a plate-like, quadratic cuboid.

As shown in Figs. 1-3, reaction areas 8 are of a vessel-type design and ever two are separated from one another by common wall 12.

ISSUES

The Examiner has rejected all the claims under 35 U.S.C. 103(a) as unpatentable over Kim et al (US 6,039,804 on the following grounds:

Kim et al discloses a crystallization tray housing as shown in Figs. 1, 2. Fig. 3 shows a side view. Each tray has a plurality of separate crystallization units arrayed as an integral part of it. The units consist of a reservoir and drop

chamber around the reservoir. Each drop chamber has a shoulder for placement of a cover slip from which a drop solution for crystal growth can be suspended (see abstract). The optimization of the geometry of the chamber is suggested in col. 6, lines 8-24. Figs. 4 and 5 (see col. 5, lines 25-56) disclose that a drop of solution for crystallization be hung over the central reservoir. Kim suggests using a transparent plastic material.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to produce a reaction vessel (i.e. a tray housing) including a housing for liquid containment with several identical reaction chambers (i.e. crystallization units), each separate, immediately adjacent, which consist of a reservoir and identical reaction areas (i.e. drop chambers) in gaseous communication, because such is suggested in Kim et al.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to rearrange the placement of the reaction areas relative to the reservoir because no change as to how the reservoir and the reaction areas coact would be expected and Kim et al suggests that other geometrical arrangements be used.

In light of this suggestion that other geometrical arrangements be used, it would have been obvious to one of ordinary skill in the art at the time of the present invention to design the reaction vessel with respect to size and shape of the recesses and reaction areas and the number contained in the vessel.

In respect to claims 21-30, 36-38 it would have been obvious to one of ordinary skill in the art at the time of the present invention to include a top part or lid with a reaction area (see col. 2, lines 63 and col. 3, lines 1-5) since Kim et al disclose such. The other limitations are obvious design choices concerning only size and shape of the chambers. Figs. 6-7 suggest the design of claim 38.

GROUPING OF CLAIMS

Appellants will argue that claims 1, 7, 27, 35, 36 and 53 each are patentable on their own merits while all the other claims are argued to be allowable with the claim whereon they depend.

ARGUMENT

Kim et al disclose a reaction vessel with crystallization units comprised of **central** reaction chambers 28 surrounded by four drop chamber (reaction areas) 32 **outside** the central reaction chambers. Reaction areas 32 are in communication with each central reaction chamber 28 by diffusion channels 30. The central reaction chamber, the reaction areas and the diffusion channels of each unit are open on top, and they may be covered by a glass cover. The bottoms of cup-shaped drop chambers 32, as well as the underside of glass cover slips 46 serve as reaction areas for the crystallization. Drops of solution to be crystallized may be suspended from the cover slips and hang down into the reaction areas (drop chambers) 32. The arrangement of the reaction vessel as well as the individual crystallization units are well illustrated in the patent drawings.

Referring more particularly to col. 6, lines 8-24, and Figs. 4 and 5 of the cited patent, the Examiner has alleged that the "optimization of the geometry of the chamber is suggested" by the patent. Applicants respectfully disagree. As is clear from the drawing and explained in col. 3, lines 47-54, each drop chamber 32 **outside** the **central** reservoir 28 is directly or indirectly connected thereto. This central

reservoir (reaction chamber) has lower surface 34, upper portion 36 and lower portion 38, and is of generally **cylindrical** shape (col. 4, line 30). As shown, the central reaction chamber as well as the surrounding reaction areas and the cover slips are generally **circular**. Throughout the description and the drawing, it is made explicit that there always is a **central** reaction chamber in communication with **surrounding** reaction areas **outside** of the central reaction chamber.

In the embodiment of Figs. 6 and 7, col. 6, lines 25-39, dividers 60 divide central reaction chamber 28' into four equal sections 58. While the dividers constitute common walls 60 separating the four reaction chamber **sections** from each other, this does in no way change the position of reaction areas 32' relative to the central reaction chamber, or suggests a common wall between immediately adjacent reaction chambers 28'. Nor does it optimize the number of reaction chambers in the reaction vessel, as claimed, if the number of drop chambers 32 arranged around central reservoir 28 is varied (col. 6, 9-11), or if the drop chambers are arranged in series, as described in Col. 6, lines 16-24.

As clearly shown in Figs. 1, 2 and 7, crystallization units 26, with their **central** reaction chamber 28 **surrounded** by reaction areas 32, are **spaced** from each other, rather than being **immediately adjacent** each other, the surrounding reaction areas 32, which protrude from the central reaction chamber, defining a **necessary distance** between reaction chambers 28 in each row and in adjacent rows, which rows are again **necessarily spaced** from each other by the amount of protrusion of the surrounding reaction areas from the reaction chamber, rather than being **immediately adjacent** each other. As clearly shown in the drawing, considerable unused areas remain between **spaced-apart** reaction chambers. Even if a person of ordinary skill in the art would move crystallization units 26 closer together to increase the number of units, which actually is not suggested by Kim et al, the surrounding drop chambers would still leave **unused spaces** between the crystallization units because the protruding drop chambers 32 between adjacent reaction chambers 28 would prevent the reaction chambers to become **immediately** adjacent. Thus, none of Kim et al's variations suggests a common wall demarcating **immediately adjacent** reaction chambers from each other (page 24, line 14). Such a common wall demarcating immediately adjacent reaction chambers from each other can**not** be obtained with the **circular**

reaction chambers 28 of Kim et al, and contrary to the Examiner's assertion that col. 6, lines 8-24, suggests such a possibility, nothing in this passage points to it. In fact, as long as the reaction chambers are circular, rather than having a shape such as set forth in claims 7, 35 and 53, for example, this "optimization of geometry" is not suggested by Kim et al. In fact, since Kim et al's drop chambers (reaction areas) 32 are **outside** the **central** reaction chambers and protrude therefrom, the reaction chambers cannot be disposed **immediately** adjacent each other but are always **spaced from each other** by the distance the reaction areas protrude from the central reaction chambers. This is clearly shown in Kim et al's Figs. 1, 2 and 7.

It should further be noted that claims 1 and 36 explicitly state that the reservoir and reaction areas are **inside** the **walled** reaction chambers (page 17, lines 5-8). In Kim et al, the reaction areas (drop chambers 32) are **outside** the walled reaction chamber (reservoir 28). In view of the above, claim 1 is respectfully submitted to be clearly patentable over Kim et al.

As shown in applicants' Figs. 4 and 6, the base surface or cross section of the reaction chambers preferably form a

parallelogram or rectangle (page 22, line 12), thus covering the **entire** area of the reaction vessel. The **circular** cross sections of the reaction chambers and reaction areas exclusively shown in Kim et al do not suggest such a configuration, and these circular configuration of Kim et al's crystallization unit components causes additional unused areas to be formed. Thus, claims 7 and 53 are believed to be patentable on their own merits.

As to claim 35, the honeycomb arrangement of **prisms**, not cylinders or cups, also makes possible the full coverage of the reaction vessel area, for which reason this claim is respectfully submitted to be patentable on its own merits, as has been pointed out in connection with claims 7 and 53.

Nothing in Kim et al suggests another reaction area **formed by a recess** above the reservoir, i.e. in cover slips 46, as recited in claim 36 amended to incorporate therein the subject matter of claim 26, much less the configuration set forth in claim 27. This has the advantage that the reaction areas on the underside of the vessel top part can be arranged closer to each other, and the danger of overflow of two adjacent suspended drops during preparation and setting of the cover on a lower housing part is substantially reduced. Accordingly, claims 36 and 27 are believed to be clearly patentable.

Appellants accordingly respectfully submit that they are entitled to a patent incorporating claims 1-3, 6-10, 12-24, 27-36, 38, 53 and 54 under 35 U.S.C. 103(a).

An Appendix containing the appealed claims is attached to this brief submitted in triplicate. Please charge the fee of $330.00 in payment of the official fee, together with deficiencies, if any, to deposit account No. 03-2468.

Respectfully submitted,

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IN TRIPLICATE
with attached Appendix

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: MAIL STOP Appeal Brief, COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450, on May 27, 2004.

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APPENDIX

1. Reaction vessel for producing a crystal from a substance in liquid form or in solution, comprising at least one housing part having several walled reaction chambers, each forming a separate gas chamber, and each walled reaction chamber having inside thereof a reservoir and several reaction areas co-operating therewith, the reaction areas being connected to one another and to the reservoir in order to exchange gas, the walled reaction chambers being disposed immediately adjacent each other in straight rows, the straight rows being disposed immediately adjacent to one another in immediately adjacent, parallel rows and distributed in an identical manner, and the immediately adjacent walled reaction chambers in the immediately adjacent, parallel rows and in each row being demarcated from one another by common walls, whereby the number of reaction chambers in the reaction vessel is maximized.

2. Reaction vessel as claimed in claim 1, characterised in that the reaction chambers are identical in structure.

3. Reaction vessel as claimed in claim 1, characterised in that the undersides of vessel floors of the reaction chambers come into contact with a plane parallel with the

standing plane.

6. Reaction vessel as claimed in claim 1, characterised in that respective adjacent reservoirs of two consecutive rows are offset from one another by a same distance and in a same direction relative to the direction of the rows.

7. Reaction vessel as claimed in claim 1, characterised in that the reaction chambers have a rectangular cross section.

8. Reaction vessel as claimed in claim 1, characterised in that at least one more or less plate-shaped housing bottom part is used as a housing part, comprising housing bottom parts co-operating with the reaction chambers and a frame extending laterally from an edge of a top face of the housing bottom part down in the direction to the undersides of the vessel base.

9. Reaction vessel as claimed in claim 8, characterised in that the vessel bottom parts comprise at least one reservoir and several reaction areas.

10. Reaction vessel as claimed in claim 8, characterised in that at least three reaction areas are provided in the vessel bottom parts.

12. Reaction vessel as claimed in claim 8, characterised in that the reaction areas of the vessel bottom parts are disposed at a height in the region of 5 mm to 10 mm above the vessel base of the reservoir.

13. Reaction vessel as claimed in claim 8, characterised in that the reaction areas of the vessel bottom parts are provided in the form of recesses with a capacity in the region of less than 5μl.

14. Reaction vessel as claimed in claim 13, characterised in that the recesses are provided in the form of a plate-shaped cuboid designs or in a cylindrically-shaped disc.

15. Reaction vessel as claimed in claim 13, characterised in that floors of the recesses are of an approximately convex curvature relative to the floors.

16. Reaction vessel as claimed in claim 8, characterised in that, seen in a plan view down onto the standing plane, the rows of reaction areas of the housing bottom part lie respectively adjacent to the rows of reservoirs.

17. Reaction vessel as claimed in claim 1, characterised in that the cross section of the reservoir in a plane parallel

with the standing plane is rectangular.

18. Reaction vessel as claimed in claim 8, characterised in that the frame of the housing bottom part and the layout of the reaction chambers are designed to conform to a standard size of a micro-titre plate.

19. Reaction vessel as claimed in claim 1, characterised in that a number of reaction chambers is provided in the housing bottom part, the number being selected from a group based on a mathematical formula of 3×2^N where N is a natural number.

20. Reaction vessel as claimed in claim 8, characterised in that the housing bottom part is made from a transparent plastics material.

21. Reaction vessel as claimed in claim 1, characterised in that a housing part comprises an at least approximately lid-type vessel cover with grooves on an underside and vessel top parts containing at least one reaction area are bounded by the grooves.

22. Reaction vessel as claimed in claim 21, characterised in that, on an edge of the underside of the vessel cover, a

frame is provided projecting beyond the underside.

23. Reaction vessel as claimed in claim 21, characterised in that the vessel top parts are designed to have several reaction areas.

24. Reaction vessel as claimed in claim 21, characterised in that the vessel top parts are designed to have two reaction areas.

27. Reaction vessel as claimed in claim 36, characterised in that the recess is of a cylindrical disc shape or in the form of a plate-like, quadratic cuboid.

28. Reaction vessel as claimed in claim 36, characterised in that the recess is designed to have a capacity in the region of less than 5 µl.

29. Reaction vessel as claimed in claim 36, characterised in that a floor of the recess forming the reaction area in the vessel top part is of an at least approximately convex curvature with reference to this recess.

30. Reaction vessel as claimed in claim 21, characterised in that, seen in a plan view onto the standing plane, the rows

of reaction areas of vessel cover lie respectively adjacent to the optionally provided rows of reaction areas of the housing bottom part.

31. Reaction vessel as claimed in claim 21, characterised in that the frame of the vessel cover and the layout of the vessel top parts are designed to conform to a standard size of a micro-titre plate.

32. Reaction vessel as claimed in claim 1, characterised in that a number of vessel top parts is provided in the vessel cover, the number being selected from a group based on the mathematical formula of 3×2^N where N is a natural number.

33. Reaction vessel as claimed in claim 21, characterised in that the vessel cover is made from a transparent plastics material.

34. Reaction vessel as claimed in claim 21, characterised in that a mask is applied to the face of the vessel cover remote from the reaction areas and, seen in a plan view down onto the standing plane, this masks surrounds the reaction areas with a light-screening surface.

35. Reaction vessel as claimed in claim 1, wherein the

walled reaction chambers are in the form of prisms with a regular hexagonal base surface and are disposed in a honeycomb arrangement.

36. Reaction vessel comprising a vessel bottom part with a vessel floor and vessel walls forming several walled reaction chambers, each reaction chamber having inside thereof a reservoir for liquid agents and at least one reaction area separated from the reservoir and having a gas connection thereto, adjacent ones of the walled reaction chambers being demarcated from one another by a common vessel wall, whereby the number of reaction chambers in the reaction vessel is maximized; a vessel top part, which lies against the vessel walls, optionally with a sealing layer in between, covering the walled reaction chambers; and at least another reaction area formed by a recess above the reservoir in the vessel top part.

38. Reaction chamber as claimed in claim 36, characterised in that the reaction areas are of a vessel-type design and every two are separated from one another by a common wall.

53. Reaction vessel as claimed in claim 1, characterised in that the reaction chambers have a base surface area in the form of a parallelogram.

54. Reaction vessel according to claim 1, characterised in that the reaction areas and the reservoirs extend in rows parallel to the rows of the walled reaction chambers, and each row of reaction areas is adjacent to a row of reservoirs in the immediately adjacent row of walled reaction chambers.